Note on Feeding Habits of the Desert Snails *Sphincterochila boissieri* Charpentier and *Trochoidea (Xerocrassa) seetzeni* Charpentier

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(1 Plate; 1 Table)

Information on the composition of the food consumed by the snails *Sphincterochila boissieri* Charpentier, 1847 and *Trochoidea seetzeni* Charpentier, 1847 has been obtained by field observations and by microscopic examination of their digestive duct content and excrement.

Sphincterochila boissieri and *Trochoidea seetzeni* are sympatric in vast areas in the Negev and Judean Deserts.

The area studied is a transition zone between the area occupied by the *Artemisietum herbae-albae* Asso, 1781 association of the Irano-Turanian territory and the *Zygophylletum dumosi* Boissier, 1849 association of the Sahara-Arabic territory. The site selected was the slopes of two adjacent hills, one facing north and the other south. Here, *Artemisietum herbae-albae* inhabits the northern slope and *Zygophylletum dumosi* the southern one (Friedman, 1969).

The *Artemisietum herbae-albae* association is accompanied by *Noea mucronata* and *Zygophyllum dumosum,* whereas, accompanying the *Zygophylletum dumosi* association are *Artemisia herba alba* and *Anabasis articulata.*

The Central Negev is a "true" desert; the annual rainfall is approximately 100 mm, restricted to 10 - 25 days during the short winter season. Air and soil temperatures show considerable fluctuations. Soil temperature varies from at times, $-3°$ C at winter night, to $+70°$ C in summer at mid-day. The environmental conditions have been described more fully in a previous publication (Galun, 1960).

The snails are active mainly during the winter season (November to April) and estivate from May to July. Activity recommences in August, September and October with appearance of night dew. There is dewfall approximately 10 nights per month.

Aeolic sedimentation of loess soil is much higher on the slope facing north; on the south-facing slope there are many flint stones and the soil is more salty.

Sphincterochila boissieri is a soil dweller. In the summer it estivates and buries itself in the soil to a depth of 1 - 5 cm (measured from the shell apex). *Trochoidea seetzeni* live mainly on shrubs. These snails also estivate in the summer and attach themselves by their calcareous epiphragms to the shrubs at a height of 10 to 40 cm.

On the slope facing south *Trochoidea seetzeni* settle mainly on *Zygophyllum dumosum,* occasionally on *Artemisia herba-alba.* On the slope facing north, *T. seetzeni* are found mainly on *Noea mucronata* (Forskal) Aschersonn & Schweinfurth, 1887, and to a lesser extent on *A. herba-alba* and *Haloxylon articulatum* (Cavanilles) Bunge, 1851. *Reaumeria palestina* Boissier, 1867 is used by them as substrate only after the plant is rinsed by rainwater. It seems that on the north facing slope *T. seetzeni* prefer *Noea mucronata* to other plants.

The lichens in abundance on both slopes are *Ramalina maciformis* (Delile) Bory, 1828 (always sterile), *Caloplaca ehrenbergii* (Müller, Argov.) Zahlbruckner,

[1] Part of a Ph. D. Thesis submitted to the Senate of the Tel-Aviv University

Table 1

Fodder remains found in the digestive duct and excrement of the snails *Sphincterochila boissieri* and *Trochoidea seetzeni*

	Sphincterochila boissieri		*Trochoidea seetzeni*	
	Slope facing		Slope facing	
	South	North	South	North
Spermatophyta:				
Tracheids	—	+	++	++
Fibers	—	+	++	++
Parenchyma	+	—	+	+
Mesenchyma	—	—	+	+
Bryophyta:				
Leaf cells of *Dematodon convolutus*	—	—	+	+
Algae:				
Trebuxia sp.	+	+	+	+
Blue-green	++	++	—	—
Fungi:				
Hyphae	+	+	+	+
Lichens:				
Buellia spores	—	+	+	++
Soil particles	++	++	—	—

1931 and *Aspicilia* sp. *Telochistes lacunosus* (Ruprecht) Savicz, 1935 grows only on the slope facing north. *Buellia canescens* (Dickson) DeNolaris is rare, and is found usually without apothecia, on the south-facing slope; whereas the rocks on the north-facing slope are abundantly covered by fruiting *B. canescens* colonies. *Buellia subalbula* var. *fuscocapitellata* M. Lamb, 1936 is rare on the south-facing side and abundant on the north-facing one. The soil on the north-facing slope is matted by the moss *Desmatodon convolutus* (Hedwig) Grout (Friedman, 1969). The digestive duct and excrement of both snail species contained plant particles as indicated in Table 1 and illustrated in Figures *1* to *6*.

Caloplaca ehrenbergii is the most common crustose lichen on both slopes. *Teloschistes lacunosus* also appears in quite large numbers on the northern slope. However, in no case were polarilocular spores, characteristic of these two lichens, found on microscopic examination in the material. On the other hand, apothecia with the brown two-celled spores (Figure *5*) of the Buellias seem to be consumed in abundance, especially by *Trochoidea seetzeni*. It is of interest to note that whereas the *Buellia* do not contain any lichen acid, the apothecia of both *C. ehrenbergii* and *Teloschistes lacunosus* contain parietin. According to Bachmann (1890), Stahl (1904) and Zukal (1896), lichens containing lichen acids are not eaten by animals. It might, therefore, be assumed that parietin functions, in this case at least, as a protective agent.

It is not possible to identify the source of the *Trebouxia* cells and the fungal hyphae found in the digestive duct and excreta. However, the snails of the area examined have a choice between thalli devoid of lichen acids and thalli containing these substances in various forms.

The blue-green algae (Figure *6*) consumed by the snails are presumably free-living forms, since no blue-green alga lichens were found in this site.

There is, so far, no way to relate the various tracheids (Figure *3*), parenchyma (Figure *4*) and fiber cells (Figure *1*) to any particular plant on which the snails feed.

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Plate Explanation

Plant particles from the digestive duct and excrement of *Sphincterochila boissieri* and *Trochoidea seetzeni*

Figures 1a and 1b: Fiber cells; a: ×240; b: ×100
Figures 2a and 2b: Leaf cells of *Desmatodon convolutus.* a: ×120; b: ×200
Figure 3: Tracheids; ×750
Figure 4: Parenchyma cells; ×150
Figures 5a and 5b: Brown, 2-celled spores of *Buellia;* a: ×700; b: ×1000
Figure 6: Blue-green alga; ×750